INF-0010

REMARKS

Claims 1-18 are pending in the present Application. Claims 1, 9, 10, and 16 have been amended, leaving Claims 1-18 for consideration upon entry of the present Amendment. Applicants appreciate the indication that Claims 9-16 would be allowable if rewritten in independent form.

No new matter has been introduced by way of amendment. For example, "gun" has been replaced with "flame source" in Claim 1 for consistency and to reflect proper antecedent basis. Furthermore, Claims 1, 9, 10, and 16 have been amended to correct for unintentional typographical errors.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

First Claim Rejection Under 35 U.S.C. § 103(a)

Claims 1, 2, 4-8, 17, and 18 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over International Patent Application Publication No. WO 97/05994 to Hunt et al. (hereinafter "Hunt") in view of U.S. Patent Application Publication No. 2002/0062789 to Nguyen et al. (hereinafter "Nguyen"). Applicants respectfully traverse this rejection.

Independent Claim 1 is directed to an apparatus for the thermal spray delivery of a solution, said apparatus comprising: a first solution reservoir; a second solution reservoir; a singular or multiple liquid injector(s) disposed in fluid communication with said reservoirs; a flame source configured to direct a thermal spray from said liquid injector to a substrate; a thermal control device disposed in thermal communication with said substrate; and a chamber enclosing the flame source and substrate which facilitates use of inert gas blanketing.

Hunt is directed to a method and device for combustion chemical vapor deposition using a very fine atomization or vaporization of a reagent containing liquid or liquid like fluid near its

supercritical temperature, wherein the resulting atomized or vaporized solution is entered into a flame or plasma torch to produce the deposited product (e.g., coating or powder).

Nguyen is directed to a method and apparatus for the chemical vapor deposition of multi-layer films.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Applicants respectfully contend that a *prima facie* case of obviousness has not been established because the cited art, individually or in combination, fail to teach all elements of Applicants' independent Claim 1. Specifically, neither Hunt nor Nguyen teach or suggest at least "a flame source configured to direct a thermal spray from said liquid injector to a substrate". In fact, Nguyen fails to even mention the use of a flame source. While Hunt does disclose a flame source, it fails to teach or suggest that the flame source is configured to *direct a thermal spray from a liquid injector to a substrate*. The Examiner's attention is respectfully directed to the Specification of Hunt, the relevant portions of which are reproduced for convenience as shown below.

> The present invention provides a method for coating a substrate with a selected material. The method comprises, at a first selected temperature and a first selected pressure, dissolving into a suitable carrier to thereby form a transport solution one or more reagents capable of reacting (where, for a single precursor reagent, the precipitation of the reagent from the solution is herein considered a "reaction") to form the selected material. At some time prior to the actual deposition, a substrate is positioned in a region having a second selected pressure. The second selected

pressure can be ambient pressure and is generally above 20 torr. The transport solution is then pressurized to a third selected pressure above the second selected pressure using a pressure regulating means. One of skill in the art would recognize that there are many suitable pressure regulating means, including, but not limited to compressors, etc. Next, the pressurized, transport solution is directed to a fluid conduit having an input end and an opposed output end having a temperature regulating means positioned thereon for regulating the temperature of the solution at the output end. **The output end of the conduit further comprises an outlet port oriented to direct the fluid in the conduit into the region and in the direction of the substrate. The outlet port can be of a shape similar to a nozzle or restrictor as used in other spraying and CVD applications.** Thereafter, the solution is heated using the temperature regulating means to a second selected temperature within 50 OC above or below the critical temperature, T', of the solution while maintaining the third selected pressure above the second selected pressure and above the corresponding liquidus or critical pressure, P, of the solution at the second selected temperature using the pressure regulating means. **Then, the pressurized, heated solution is directed through the outlet port of the conduit into the region to produce a nebulized solution spray in the direction of the substrate. As the solution is directed into the region, one or more selected gases are admixed into the nebulized solution spray to form a reactable spray and, thereafter, this reactable spray is exposed to an energy source at a selected energization point. The energy source provides sufficient energy to react the reactable spray (which contains the one or more reagents of the transport solutions) thereby forming the material and coating the substrate therewith.**

In a further embodiment of this method, the energy source comprises a flame source and the selected energization point comprises an ignition point. In an alternate embodiment, the energy source comprises a plasma torch.

(Hunt; page 11, line28 through page 12, line 29; emphasis added)

In addition to the above methods, the present invention also provides an apparatus for coating a substrate with a selected material. Referring now to Figure 1, the apparatus 100 comprises a pressure regulating means 110, such as a pump, for pressurizing to a first selected pressure a transport solution T (also called "precursor solution") in a transport solution reservoir 112, wherein the transport solution T comprises a suitable carrier having dissolved therein one or more reagents capable of reacting to form the selected material and wherein the means for pressurizing 110 is capable of maintaining the first selected pressure above the corresponding liquidus (if the temperature is below T,) or critical pressure, P, of the transport solution T at the temperature of the transport solution T, **a fluid conduit 120 having an input end 122 in fluid connection with the transport**

> **solution reservoir 112 and an opposed output end 124 having an outlet port 126 oriented to direct the fluid in the conduit 120 into a region of a second selected pressure below the first selected pressure and in the direction of the substrate 140,** wherein the outlet port 126 further comprises means 128 (see Figures 2 and 3, atomizer 4) for nebulizing a solution to form a nebulized solution spray N, a temperature regulating means 150 positioned in thermal connection with the output end 124 of the fluid conduit 120 for regulating the temperature of the solution at the output end 124 within 50 T above or below the supercritical temperature, Tc, of the solution, a gas supply means 160 for admixing one or more gases (e.g., oxygen) (not shown) into the nebulized solution spray N to form a reactable spray, **an energy source at a selected energization point 172 for reacting the reactable spray whereby the energy source 170 provides sufficient energy to react the reactable spray in the region of the second selected pressure thereby coating the substrate 140.**
>
> (Hunt; page 15, line 29 through page 16, line 20; emphasis added)

As described in Hunt, the flame source is used only to provide sufficient energy to convert a nebulized or vaporized precursor solution into a final product. However, the flame source is not configured to *direct the spray towards the substrate* as instantly claimed. Instead, the outlet port of the fluid conduit is configured to direct the spray to the substrate.

Therefore, Hunt fails to teach or suggest "a flame source configured to direct a thermal spray from said liquid injector to a substrate". Owing to its absolute silence regarding a flame source, Nguyen too fails to teach or suggest this feature. Accordingly, the cited references fail to establish a *prima facie* case of obviousness.

In addition, Applicants note that both Hunt and Nguyen are directed towards chemical vapor deposition (CVD) processes and apparatuses. As known to those skilled in the art of Applicants' disclosure, CVD is markedly different from thermal spraying. Hunt, on page 3 at lines 17-19, specifically states: "the CCVD process has much of the same flexibility as thermal spraying", indicating this fact. Therefore, Applicants also traverse the rejection on the grounds that the cited references are non-analogous art, and cannot possibly render obvious claims directed to an "apparatus for the thermal spray delivery of a solution".

In view of the foregoing, Applicants respectfully request withdrawal of the rejection to Claims 1, 2, 4-8, 17, and 18

Second Claim Rejection Under 35 U.S.C. § 103(a)

Claim 3 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Hunt in view of Nguyen as applied to Claim 1 in the First Claim Rejection Under 35 U.S.C. § 103(a) above, and further in view of International Patent Application Publication No. WO 98/41316 to De Graaf et al. (hereinafter "De Graaf"). Applicants respectfully traverse this rejection.

Hunt and Nguyen are discussed above.

De Graaf is directed to an apparatus for applying multi-component coating compositions.

Applicants assert that a *prima facie* case of obviousness has not been established against Applicants independent Claims 1 because De Graaf fails to compensate for the deficiencies of both Hunt and Nguyen. Like Nguyen, De Graaf is silent regarding a flame source. Thus, the cited references fail to teach all elements of the claims, notably the "flame source configured to direct a thermal spray from said liquid injector to a substrate".

Accordingly, Applicants respectfully request withdrawal of the rejection to Claim 3.

INF-0010

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By _____
Dean Y. Shahriari
Registration No. 56,783

Date: August 25, 2005
Telephone (404) 607-9991
Facsimile (404) 607-9981
Customer No.: 23413